

## THE BURROWING NEMATODE INFECTING BLACK PEPPER

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The burrowing nematode (Radopholus similis (Cobb, 1893)), which is well known in Florida as the causal agent of spreading decline of citrus, is also widely known as a destructive pathogen of black pepper (Piper nigrum L.) in other parts of the world (1,5,7). Black pepper, which has been under cultivation on the island of Bangka in Indonesia for at least 50 years, was afflicted in the 1930s with a disease called "black pepper yellows". It is also known as "the yellows disease of peppers" or "pepper yellows" (2,3,4,5,6). The leaves of the infected pepper vine begin turning pale yellow, a few at a time, until a large portion or all of the foliage is affected. Growth is halted, and dieback and death follow soon afterward (3,4,6). The feeder roots are destroyed, and extensive necrosis develops in the larger roots. It has been estimated that at one time, the commercial black pepper production of Bangka was reduced by 90% because of the burrowing nematode (1). The devastation of this disease in 1953 was so spectacular that it became a textbook example (2,4,6). In 1976, Ichinohe reported that the yellows disease attributed to R. similis is "now hard to find", and that 50% more land is under cultivation than before World War II (3). This recovery appears to be due in part to planting pepper on new land which is free from burrowing nematode, and to the discontinuance of pepper production on land known to be infested with burrowing nematode.

More recently, the burrowing nematode has been associated with diseased black pepper vines in Kerala, India. Large numbers of nematodes were found infecting the roots of black pepper vines showing symptoms of a disease called "slow wilt" (7). From the roots of pepper vines afflicted with slow wilt disease, R. similis were isolated and cultures were multiplied on pepper and banana (Musa sp.). Rooted black pepper cuttings with uniform stem girth, node length, leaf and lateral root numbers were potted and inoculated with 10, 100, 1000, 10,000 nematodes each in replicates of eight. Some of the plants inoculated with 1000 and 10,000 nematodes began wilting after 90 days and were dead after 118 days. Shoot growth had been reduced 72-90%. Leaves, reduced by half in number, were smaller in size. No yellowing of the leaves of inoculated plants was observed. In general, stunting increased as inoculum levels increased. Most of the nematodes penetrated the roots within 24 hours of inoculation. The root tips were the preferred sites of entry, although some individuals penetrated 1-1.5 cm above the tips. Eggs were laid inside the roots within 6 days after the nematodes entered. Discolored cells and dark brown lesions appeared at the sites of penetration. Parenchyma cells around the infection site were blackened and became necrotic. The stelar portions were not affected.

### SURVEY AND DETECTION:

- 1) Examine plants for stunting, chlorosis, dieback or general unthriftness.
- 2) Submit approximately one pint of roots with adherent soil to a nematology laboratory.

#### LITERATURE CITED

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